

REMARKS

Claims 1, 6, 11, 14 and 16 have been amended. Withdrawn claims 5 and 10 have been canceled in this paper. Claims 1-4, 6-9 and 11-16 remain pending in this application. Applicant reserves the right to pursue the original claims and other claims in this application and in other applications.

Affirmation of Election

On December 13, 2005 Applicant's representative received a telephone call from the Examiner regarding the above captioned patent application. The substance of the telephone call concerned a restriction requirement. The inventions were grouped as follows:

Group I, claims 1-4, 6-9 and 11-16 (power supply with a series regulator); and
Group II, claims 5 and 10 (power supply to power plural loads).

During a subsequent telephone conversation, Applicant's representative elected group I without traverse. Pursuant to the Examiner's request, Applicant and Applicant's representative affirm this election in this paper.

Office Action Merits

The Examiner has requested a new title of the invention. Applicant has amended the title to read "POWER SUPPLY APPARATUS HAVING PARALLEL CONNECTED SWITCHING AND SERIES REGULATORS AND METHOD OF OPERATION." Acceptance of the new title is respectfully solicited.

Claims 1-4, 6-9 and 11-16 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Hiraki (U.S. Patent no. 6,424,128). The rejection is respectfully traversed.

Claim 1 recites a power supply apparatus comprising a “switching regulator which performs start and stop operations in response to a first control signal and generates a first constant voltage in response to a first voltage switching signal to output the first constant voltage as a first output voltage; a series regulator which performs start and stop operations in response to a second control signal and generates a second constant voltage in response to a second voltage switching signal to output the second constant voltage as a second output voltage; and a controller which generates the first and second control signals and the first and second voltage switching signals.” According to claim1, the controller “controls the switching regulator and the series regulator to simultaneously operate for at least a predetermined time period to lower a voltage level of the first output voltage using the first and second control signals, respectively.” Applicant respectfully submits that Hiraki fails to disclose the claimed invention.

Referring to Hiraki Col. 9, l. 28 to Col. 10, l. 38, Hiraki discloses an electronic device having a regulator circuit 110 for powering an “internal” circuit such as a CPU 101. The regulator circuit 110 includes a switching regulator 120, a first series regulator 130 and a second series regulator 150 which power the CPU 101 based on the operating mode of the electronic device. There are three operating modes: active, stand-by and shut-down. A signal S102 from the CPU 101 or an external signal S107 signifies the operating mode. The internal signal S102, or the external signal S107, causes a power supply control circuit 113 to generate three signals S113, S114, S116 to control the on/off state of the switching regulator 120, a first series regulator 130 and a second series regulator 150, respectively. Another control signal S101 generated by the CPU 101 sets the reference level voltage V_{ref} used in the regulator 110.

As shown in Hiraki’s Table 4, the only time the switching regulator 120 and a series regulator 150 are operated during the same time interval occurs during the active

mode. Unlike the claimed invention, however, the two regulators 120, 150 are active the entire time the electronic device is in the active mode. During the Hiraki active mode, the output of the regulators 120, 150 are constant and are supplying the power needed to operate the electronic device during the active mode. That is, a voltage output of the switching regulator is not being lowered (as is recited in claim 1). As such, Hiraki fails to disclose or suggest controlling "the switching regulator and the series regulator to simultaneously operate for at least a predetermined time period to lower a voltage level of the first output voltage using the first and second control signals, respectively."

Moreover, Applicant respectfully submits that Hiraki's S101 signal cannot be the claimed first control signal (as argued in the Office Action) because the S101 signal merely sets the reference level voltage V_{ref} used by all of the regulators 120, 130, 150. In the claimed invention, the first control signal controls the switching regulator to perform "start and stop operations." This is another reason why claim 1 is allowable over Hiraki.

Accordingly, Applicant respectfully submits that claim 1 is allowable over Hiraki. Claims 2-4 depend from claim 1 and are allowable along with claim 1.

Claim 6 recites "controlling means for generating the first and second control signals and the first and second voltage switching signals, controlling the switching regulating means and the series regulating means to simultaneously operate for at least a predetermined time period to lower a voltage level of the first output voltage using the first and second control signals, respectively." As such, claim 6 is allowable for at least the reasons set forth above and on its own merits. Claims 7-9 depend from claim 6 and are allowable along with claim 6.

Claim 11 recites a power supply method comprising the steps of “generating a first voltage switching signal for causing the switch regulator to generate a first voltage output; generating a second voltage switching signals for causing the series regulator to generate a second voltage output; and controlling the first and second voltage switching signals such that the switch and series regulators operate simultaneously in the time period to lower a voltage level of the first output voltage.” As such, claim 11 is allowable for at least the reasons set forth above and on its own merits. Claims 12-13 depend from claim 11 and are allowable along with claim 11.

Claim 14 recites a control step that “controls the first and second control signals to simultaneously activate the switching regulator and the series regulator for at least a predetermined time period to lower a voltage level of the output of the switching regulator.” As such, claim 14 is allowable for at least the reasons set forth above and on its own merits. Claim 15 depends from claim 14 and is allowable along with claim 14.

Claim 16 recites a controlling step that “controls the first and second voltage switching signals such that an output voltage of the switching regulator is greater than an output voltage of the series regulator and such that switching and series regulators operate simultaneously when lowering a voltage level of the output voltage of the switching regulator.” As such, claim 16 is allowable for at least the reasons set forth above and on its own merits.

Applicant respectfully requests that the rejection be withdrawn and the claims allowed.

In view of the above amendment, Applicant believes the pending application is in condition for allowance.

Dated: April 25, 2006

Respectfully submitted,

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